



WESTERN
PACIFIC
REGIONAL
FISHERY
MANAGEMENT
COUNCIL

Marine Education and Training Program Development Workshop

**April 15-16, 2008
Council Office
Honolulu, Hawaii**

The Western Pacific Regional Fishery Management Council (Council), through its Advisory Panels, Plan teams, Regional Ecosystem Advisory Committee and public hearing process, is aware of the public call for for marine training and education. To address this, the Council planned two workshops to address the mandates of Section 305 (j) of the Magnuson Stevens Fishery Conservation and management Act (MSA). Section 109 of the Magnuson-Stevens Reauthorization Act (MSRA) amended the MSA to include a broad mandate for marine education and training under Section 305 (j) and that this should be a joint effort of the Western Pacific and Northern Pacific Council. The Council directed that two workshops be scheduled to address this mandate. The first workshop or conference was planned for September 4 – 9, 2007 but was postponed to consider the advisability of joining with the North Pacific Council this early in the development of the initiative. A workshop was scheduled for early 2008 to start the program.

Introduction

At the 138th Council meeting, the Council recommended that traditional cultural practitioners should be invited through the Aha Moku/Aha Ki`ole in Hawaii, Department of Chamorro Affairs in Guam, DMWR in American Samoa, Office of Indigenous Affairs and Office of Carolinian Affairs in CNMI to the Marine Training and Education Workshop on September 2-6.

At the 137th Council meeting the Council directed the staff to continue the education and outreach efforts and Community Development Program efforts to stimulate interest by young people in fishing and traditional methods/knowledge and to help educate Chamorros/Carolinians on the value of sustainable ecosystems to perpetuate their customs and traditions.

At the 118th Council meeting the Subsistence and Indigenous Advisory Panel made recommendations for a plan for training and education of the indigenous community. The recommendations were:

“ 4. Directed staff to develop a plan for training and education of the indigenous community in fishing and fisheries, supporting the training of communities in marine monitoring and data gathering for locally managed marine resources.

5. Directed staff to contract a coordinator to develop an education team, consisting of senior and master fishers of all fisheries and to make and develop materials and curriculum that can be distributed and utilized by programs to prevent the loss of traditional knowledge and practices.”

This broad recommendation for outreach and education in many varied aspects of fishing and fisheries was a response to requests from the communities and constituents in the Western Pacific region. The recommendation called for a plan to:

- provide cultural training for fishing and fisheries,
- provide training for monitoring and data gathering for locally managed fisheries,
- develop curriculum and deliver training for the preservation of the traditional knowledge and practices,
- Develop materials on traditional fishing practices, fishing and fisheries that can be distributed and utilized by programs.

The Council endorsed the recommendations.

Background

The Council developed diverse curricula, projects and programs to promote sustainable fisheries, represent the Council process and educate the public on fishing activities and regulations. Displays and participation in fish and marine forums allowed for the dissemination of materials and afforded face to face contact with the public. Presentations and guest lectures at educational institutions, conferences and conventions have taken the Council’s message out to the public.

The Council developed a plan for public outreach and involvement in the Council process and product development in 1995. Elements of the plan have been pursued and, though not fully implemented, have been used to guide the Council’s efforts in public outreach and education.

Marine Education and Training Workshop, April 15 – 16, 2008

In partnership with National Marine Fisheries Service Pacific Islands Regional Office (PIRO), the Council convened a workshop to address the mandates of MSA Section 305 (j) on April 15 – 16, 2008, at the Council conference room. The workshop was hampered by an inconvenient time and insufficient funding. 22 participants were invited: 3 from American Samoa, 3 from Northern Mariana Islands, 4 from Guam and 12 from Hawaii. Of the 22, representatives from the Office of Samoan Affairs, the Department of Chamorro Affairs and The Nature Conservancy, Marine Conservation Fellowship Program did not attend. Participants’ list is attached (Appendix A).

Kitty Simonds, Joshua DeMello and Charles Ka`ai`ai represented the Council. Mike Tosatto, Deputy Regional Administrator, and Scott Bloom, Program Officer, represented PIRO. Ms. Kuumealoha Gomes served as facilitator.

Mr. Henry Sesepasara from American Samoa offered a prayer in Samoan to open the meeting. Ms. Gomes provided information to participants. She established some ground rules for interaction and went over items on the agenda. She then asked all of the participants to introduce themselves and provide a little information about their background. All of the participants introduced themselves. They noted that they were somewhat puzzled about the purpose of the workshop even after reviewing the material that was provided in preparation for the workshop.

Kitty Simonds welcomed the participants. She gave a brief background on the Council and its mission, including indigenous and community rights. She briefed the participants on how the workshop responds to the MSA.

Mike Tosatto introduced himself and provided a short description of why the group was brought together and why NOAA and the Federal government are putting this program together. Part of this workshop is to gain an understanding of what kinds of programs and projects exist in the region and to determine the gaps in the marine education and training available region-wide relative to Section 305 (j) of the reauthorized Magnuson Stevens Act.

Review of MSA § 305 (j) – Goals and Objectives of the workshop

Charles Ka`ai`ai made a presentation (Powerpoint presentation attached, Appendix B) on the Goals and objectives of the workshop:

- Develop a Pilot program that addresses the mandates of Section 305 (j)
- Understand what kind of programs currently exist in the region
- Determine the “gaps,” relevant to MSA Section 305 (j), Marine Education and Training, that exist in the region
- Develop a process to fill those “gaps.”

The Primary Goal of the program is to develop a regionally based marine education and training program to foster (support, advance, improve):

- Understanding,
- Practical use of knowledge (to include traditional knowledge),
- Technical expertise for stewardship of living marine resources.

Objectives of the program:

- To increase involvement of community residents in fishing, fishery management and seafood-related operations.
- Improve data collection methods and technology to increase data quality, use these methods and technologies among fishing sectors and share with other nations in the Pacific.

The process to achieve these goals is the development of cooperation and partnerships between:

- Secretary of Commerce
- Fishery Management Council
- Educational Institutions
- Training entities and organizations.

The beneficiaries of the program are coastal community residents (to include the indigenous community) of the Western Pacific. Benefits from the establishment of the program, relevant to marine resource issues, are:

- Communication,
- Education,
- Training, and the
- Increase of scientific education for marine-related professions.

Six program components are described in Section 305 (j) (Appendix C):

- A. Employment training in
 - Marine technology
 - Marine related professions
 - Marine resource conservation and management
 - Marine science
 - Maritime operations.
- B. Fisheries and seafood-related training
 - Fishery observers
 - Seafood safety
 - Seafood marketing
- C. Outreach Programs for consumer education
 - On quality and sustainability of wild fish
 - On fish products farmed through responsible aquaculture
- D. Identify methods and technology to improve:
 - Data collection
 - Data quality
 - Data reporting
 - Sustainability of fishing practices
- E. Develop means by which local and traditional knowledge can enhance science-based management of fishery resources in the region.
- F. Develop partnerships with agencies, academic institutions and other entities.

Future Funding and Budgeting

Deputy Regional Administrator Mike Tosatto reported on the future funding prospects and budgeting process for the program. He wanted to give a review of funding

and budgeting up front before the group got into building the program. He said that the MSA gives DOC/NOAA/NMFS the authority to do something, but the agency needs to go through the program development and implementation planning process to get the appropriations through congress.

The NMFS divided the MSA into 3 tiers. Tier 1 seeks funding for things that have a solid date in the MSA and funds were sought in 2008; Tier 2 has mandates that have things like overfishing that affect the management and sought funds for 2009; Tier 3 has all other things that are mandated and was put into the budgets for future funding in 2010.

The Marine Education and Training program is split between Alaska and the Western Pacific. The program is asking for \$2.7 million, with \$1.5 million for the Western Pacific region. These numbers are not set or final, but they are in the 2010 proposal and funds may come sooner or later, it's all a part of the budgeting process.

Funding for projects will depend on this program and how it's built in this meeting. Currently, the NMFS has looked at estimating funds by components, but this group will be able to fine tune the funding allocation. This workshop will provide the NMFS with information on what is being done and where projects need to be created or funded.

NMFS hope to have increases in other funding sources (cooperative research, SK grants, CDPP, BWET (NOS), Seafood Safety, NOAA Education, internship/fellowships, Community based habitat restoration (Coastal Community opportunities), etc.) so those kinds of projects can be funded under other sources besides the MET. They will look at other sources to provide funding for projects that may overlap. They are committed to finding the funding to support the program and hope there is new funding available for MET in 2010.

Existing Marine Education and Training Programs in the Region

Kuumealoha Gomes explained how this section would work. In a very short period of time we needed to have every participant be able to report on educational initiatives in their organization and in their geographic area and address the components of the Marine Education and Training program. Under each of the six component topics, participants are given an opportunity to report on their expertise and knowledge area as well as address a component area. We know that many organizations will have programs and projects that overlap and address other topic areas, but we hope that this provides an opportunity to cover a lot of ground in a short period of time.

A. Employment Training

University of Guam Marine Lab-Susanne Wilkins

University of Guam (UOG) Marine Lab (ML) was established as a research unit of UOG in 1970-a research, teaching and service facility located on the shore of Pago Bay.

There are 3 buildings at the facility-research, technical (wood/metal/cold storage), and annex (genetic biology lab, library).

Flowing seawater system and 3 vessels (14-21 ft) are available for research. Most of the work is done in nearshore waters. Mission of the ML is basic and applied research on the biology of tropical marine organisms with an emphasis on the conservation and development. Research is done in conservation biology and reef management, chemical ecology (biochemistry), fish ecology, coral biology, and systematics (formal study of the diversity of life).

ML provides technical assistance related to marine assessment and management and has published 121 technical reports. ML also conducts environmental assessments and survey and impact assessments.

UOG ML has only one undergrad class in marine biology and a Masters in Biology. Graduate courses are available with marine science topics.

Outreach materials for the ML are Websites, published proceedings, educational videos and CDs, electronic deatatabases, books, Guam coastal atlas. Books published include Guam Coastal Resources Volume III-Fishing on Guam.

ML supports development of a marine science curriculum for teachers to properly teach it to school children, training for science teachers to be able to adapt to different grade levels and choose different programs or courses and activities that are suitable and grade level appropriate. Once the curriculum is done, teachers will be invited to the ML for show and tell.

ML also develops Reef in a box: Puzzles, coloring pages, activities provided to children (geared toward middle schoolers) that focus on marine education.

Assessment and management of coral reefs class tries to standardize methods used for field study and collection/processing of data; identify common marine organisms. The class was held two times because of lack funding support. ML held coral disease workshop in 07 and another to be held in 08 with participants from the region.

Community service and outreach program are promoted through extension agents, students, and faculty: science fairs, mentoring high school students, conducting course/seminars, participate in special educational events and exhibits, monthly public lecture series.

Dr. Wilkenson outlined the needs of the ML: Financial, local budget and grant restraints. The ML is supported by government and the government is behind the allotments by about \$10 million, so facilities, infrastructure and program is weakened and damaged. ML is running out of space and understaffed, but is just starting to build capacity again. Some problems is that the government gets bulk grants and takes the indirect funding before sub-granting other groups.

University of Hawaii (UH) Marine Options Program (MOP)-Yuko Stender

MOP has 2 parts, one part of which is undergraduate and one for communities. It is 30 year old program. It sponsors field trips to fish auction, aquaculture facilities and labs. MOP works with the Native Fishery Observer Program. They are subcontracted by Alu Like to provide training to candidates in preparation for certification as fishery observers.

The Undergraduate is a certificate program, students must earn 16 credits and conduct a project within their major with a marine interest. Students develop a network within the marine community through their work. Some work examples are ecological survey underwater. MOP students are employed by NOAA for their stranding response teams.

MOP's community outreach includes participation in festivals and science fairs.

Hawaii Pacific University (HPU) -Chris Winn

There are 6-9000 students at HPU. They do lots of military training. There are 2 campuses and the Oceanic Institute. Students from all over the world (over 30% are international students). HPU has 50 undergraduate major programs and a number of master's programs.

College of Natural Sciences has 30 faculty; 10 full-time researchers. Oceanography and Marine Biology are offered as majors. Currently there are 10 students in the Marine Science graduate program. Marine Science is trying to bring in aquaculture into the curriculum, but not too much interest by students, though there is lots of expertise available in aquaculture.

Dr. Winn addressed current need: How to promote aquaculture through education-they have the expertise, but not the students. Funding is available for students to come to other programs but not aquaculture. Need to get funding opportunities for students. HPU would like to get more pacific islanders into their program.

Mike Tosatto said that Aquaculture is an idea whose time is coming and is glad that it is an important piece of the pie. Need to go back to look at the components of the MSA. John Kaneko commented that we need to look at the intent of the MSA and whether we are talking about Federal marine species or backyard aquaculture. Tosatto stated that the requirements are broad and everything is on the table.

Lawrence Duponcheel from Tinian said that aquaculture is a great way to get involved in science. Hands on and training for teachers would be a good thing for HPU to do. Videos and television is the right media approach. Dr. Winn said that there are aquaculture courses but there are not a lot of people taking the classes.

Herman Tudela from Saipan said that people don't typically eat tilapia in CNMI, so aquaculture work should focus on other species. Martin Mendiola of Rota NMC said that aquaculture has a place in fisheries and conservation.

Winn said that some people were focused on fisheries, but some of the components don't discuss only fisheries as marine technology and maritime operations. Mike Tosatto responded that its not limited to fisheries and we're not limited to thinking about them, but the more the programs are available to the community, approved by the Council, benefits more than one component, the higher possibility of funding there is.

Honolulu Community College (HCC)-Mark Kimura

Mark Kimura provided the program overview and brochure to the group (Appendix D). The HCC provides a lot of the technical programs (welding, automotive, etc).

Marine Education and Training Center (METC) is located at Sand Island; Has 4 boat building and repair bays at the facility-one for wood, one for fiberglass, one for painting, and one for engines/other. Part of the training is the maintenance and fabrication of boats-a 2 year Associates in applied sciences; The Polynesian Voyaging Society and HCC have partnered to help maintain Hokulea. The training at METC is what you'd find in a drydock yard. There are dedicated classrooms in the building, first year and second year curriculum.

METC is capable of accommodating vessels up to 65 feet in length; Regarded as a premier facility in the US, possibly worldwide, doing what they are doing. They do boat hauling and using heavy equipment, vessel transfer trailers, blocking procedures, forklift training, composite technologies, vessel repair, woodworking, plumbing, electrical, etc. Now offer a certified composite technician course and certificate.

They also do vessel blueprint reading and creation; can use for the preservation of vessels such as canoes-get the measurements and create blueprints, or lofting (drawing up a full-sized hull).

METC can take up to 20 students every fall, but its not always full. The first semester is the trial for the students. Free for women sometimes. The program was created 10-11 years ago. Funding has been hard to keep stable.

Are there shorter training for certain topics? It can be available by special request to the program director. What happens to the products? The program can sell stuff to recover costs and money goes to funds to support the program.

Northern Marianas College (NMC)-Martin Mendiola/Lawrence Duponcheel

NMC is building a mariculture training center on Saipan. Scholarships are available for their natural resource program. They are working through the kinks of their program but would like to see how they can connect through the other institutions doing the same kind of thing. They can use their 2-year degree as a stepping stone into other programs in marine science.

They do recruitment at the high school level and deal with marine science career. They try to focus on what jobs are available in the islands, and would like to let these kids know in school so that they have the option to come back and work in the islands. NMC outreach is promoting careers at the high school level.

Yuko Stender of MOP said that they would like fisheries training. Josh said that summer courses will be available for Guam, CNMI, American Samoa, and Hawaii.

Cliff Kyota of Guam 4H said that there should be more opportunities for kids to get into fisheries and fisheries workshops should be held to get kids interested in fishing.

American Samoa Community College (ASCC)-Mikaele Etuale

Teacher retention is difficult in American Samoa, especially in Marine Science. ASCC is in the process of redefining the mission of the marine science program to include the program in the sciences program.

ASCC has a 74 credit program in Marine Science for an AA. The purpose is to educate students with regard to conservation and sustainability, inspire learning in field of Marine Science and facilitate advancement in terms of college track and work force.

The goal of the program is to work towards replacing contract workers with qualified and degreed resident American Samoans. Academics articulated towards UHM and UHH. Special classes for aquaculture and marine ecology; there are hands on field studies and service learning.

The program has earn and learn opportunities (internships), work/study partnerships, and aquaculture/sea grant classes. These opportunities provide a financial incentive (pay or stipend) along with academic credit.

ASCC is working on creating a marine science building similar to Guam's Marine Lab.

ASCC needs: recruit students; hire instructors; rebuild the program;

B. Fisheries and Seafood-related training

Alu Like (AL)-Eddie Agae/Clark Fields

Alu like is a non-profit organization providing social services to the community. Provided a brief overview of what the observer program is and does. He said that you need a degree or college education to be an observer. In 1999-2000, there was a great need for fishery observers, and Alu Like came up with a training to help indigenous people in the pacific become an observer. Problem was that native people didn't have the required degree to become one. Alu Like submitted the proposal to NOAA/NMFS to provide the skills needed to become an observer so that indigenous people can circumvent this requirement. Since 2001, the program has been in existence and has recruited from all the places in the Western Pacific region.

The problem is that the observers have to stay in Hawaii to work because there isn't a big need in American Samoa, although they do use observers, and CNMI/Guam doesn't currently have longline fisheries.

Four observers have reached the 1000 days at sea bench mark, three are from the native observer program. Problems with the program include: general education (English, species ID, boating, etc)-Math and English was lacking, but the other areas were outstanding.

Alu Like recognizes that there is a need to have fishery management training at the high school, middle school levels, need to create excitement in fishery management for the children to get into marine sciences.

The program brings people to Hawaii and provides the certification course to become a fishery observer.

PacMar, Inc.-John Kaneko

PacMar is a private company that consults on marine and seafood issues. They do research on commercial fisheries and seafood training for NOAA. Seafood safety is talking about public health and hazards related to seafood. They first started by looking at the federal regulations for seafood in the late 90s. Looking at the other end of the fishing business where the fish coming off the boats becomes food and enters into commerce. There are certain regulations that need to be followed to be safe for consumers.

PacMar has been involved in HACCP training for food safety controls for all companies that produce seafood for the US market. HACCP requirements are being met by some of the certification training that they do. They provide training all around the Pacific and help people recognize the restrictions on sanitation, developing good food safety management practices, etc. as a business is being developed or running.

PacMar also works on histamine and mercury in fishes. Sustainability is a big thing in the US (is it an appropriate choice to buy certain fish?), distinctions between well managed fisheries and those we know little about. PacMar works in Seafood marketing-sustainability, how to back up statements like "buy Hawaii seafood because it is fished sustainably."

They scored Hawaii's longline fishery (using UN-FAO Code of Conduct) at 93%. All NOAA fisheries should score around that because we have a lot of active research, science, and management to keep the fisheries healthy. Using the UN-FAO Code of Conduct to score fisheries was a project of PacMar.

Need: Educating consumers-what fisheries are, who is involved (NOAA, USCG, etc), what the truths are, etc. PacMar does educational tours for different people (writers, teachers, observers, etc) of the fish auction and the showcase of proper management of

seafood. They also work with the Council on teacher education, lectures to school kids, organizer of the Hawaii Fishing and Seafood festival.

Developmental Disability Council (DDC) -Henry Seseapasara

Henry Seseapasara noted that DDC doesn't have anything to do with this, he is the Executive Director of the program, but he has been with the Department of Marine and Wildlife Resources in American Samoa as the Director and has a background in marine biology. He has a demonstration project through the Council's Community Demonstration Project Program (CDPP) to utilize the bycatch in the longline fishery of American Samoa. Instead of throwing back the wahoo, marlin, and mahimahi, the project is trying to create a market for these fish. That way bycatch in that fishery is reduced.

Project participants are going through training for seafood safety, but other requirements like temperature and condition differ between federal regulations and places like the cannery. They are trying to market the fish locally, but would also like to send the products to Hawaii and US mainland. They also are looking at other opportunities like the school lunch program and using the cannery to can other species like Wahoo.

C. Identify methods and technology to improve data collection

Guam Fishermen's Cooperative Association (GFCA)-Michael Duenas

GFCA markets the fish from reef to pelagic species and helps fishermen with different kinds of training, understanding regulations and marketing. GFCA also collects data from fishermen to help with understanding Guam's fishery.

Data collection-

1. Commercial fishermen's data survey-takes into account the number of fish per species, total weight, price per pound, date, location, number of fishermen, hours. Only collects what is sold to the coop, but a lot were taken home or given away that weren't accounted for.
2. Volunteer data collection program-to help pick up the slack of how much fish is taken home instead of sold. Put into a separate survey with the same information of the commercial survey, but also fish released. They also put shark interactions on the survey.

Other things they want to put on the survey is that other things aren't collected like-weather, why they didn't fish (moon phase, TEK), etc. Also, the analysis of the data needs to include things like deaths of good fishermen, typhoons, etc., information that isn't collected or reported that could affect catch and effort.

The data is taken at shore, at the co-op. The volunteer survey data are collected at drop boxes at known sites. 85% of the commercial catch is sold through the coop.

Ulua Tagging Program-Clay Tam

Clay Tam presented the ulua tagging program objectives and results. The project started with concern by fishermen about their resources, especially the ulua, which is Hawaii's number one fishery. Data was lacking from Hawaii, and the project was to get basic data on jacks and what is happening with the resources. It started as a project with two fishing clubs in Hilo then later opened up state wide with the State of Hawaii backing.

It's an angler-based project modeled after South Carolina's project on tagging. It uses fishermen to catch and tag fish and record data (length, location, species, date and tag number). Data gives distribution, habitat, etc.

Fish are later recovered by a fisherman and the same data is recorded. They can release the fish or keep it. For recovering the fish they get a free t-shirt when the recovery data is given back. They also get information back on where their fish was originally tagged, where it went, how much it grew, etc.

He also showed some results of the program. 2,525 volunteer anglers (most on Oahu) and tagged over 31,000 fish (most on Oahu) and over 4,000 recovered (13%- which is decent for tagging fisheries). They are able to track fish around the year and when fish come in and when they recruit. They are also able to see the growth rates. They also found out best times for fishing and movement patterns of fish.

Clay talked about benefits to the community and benefits to the State. Including promoting conservation, turning fishermen into stakeholders and having fisherman give something back. It also provides an opportunity for community-based management of this fishery resource and the fishery.

Lawrence Duponcheel commented that the CNMI needs to increase involvement and increase acceptance of management tools and programs.

D. Outreach Programs for Consumer Education

Guam 4H Program-Cliff Kyota

The Guam 4H program holds an annual fishery workshop in Guam which teaches children safety and fishery methods including nets, trolling, and spearfishing. They are also trying to show kids modern methods of fishing including longline.

During the school year they go to schools to teach fishing and methods. They are also working with the Coop on eating fish-with recipes and preparation methods.

The age group for the training during the school year is 7-10 years old, and the summer program serves children ages 9-15. They also teach kids which fish eats what, when certain fish are available (fish biology), and how moon phases affect fishing (cultural information).

Guam Fishermen's Cooperative Association-Michael Duenas

The cooperative brings fish to the kids and the UOG/4H program to show the kids the difference between the fish and species ID. They can also demonstrate the feeding habits by different physical characteristics. They also provide seafood handling and training-sanitation, handling, icing, etc. and teach about ciguatera and histamines. They have also developed posters and handouts for the community. Also created do's and don'ts of fish handling and seafood safety. They will also teach kids what to do with the fish after its caught-cleaning, scaling, then how to cut the fish, portion control, vacuum packaging, how to make different food including sashimi, poki, and kelaguen.

GFCA also holds an annual fishermen's festival as a free event for the community. They also have a fish handling workshop open to all fishermen-safety at sea, VSOP, HAACP, coast guard training, fishing training (ID, fishing methods, coop tour), etc.

They also help out other community organizations such as the boy scouts, the military, etc. by taking them out on fishing trips and teaching classes.

UH Sea Grant-Darren Okimoto

Based at UH under SOEST, Sea Grant is a nationwide network of 31 university programs that are federal-state programs (NOAA is the federal and coastal universities are the state programs). NOAA provides core support. State funding match is 50%. The hallmark of the Sea Grant program is that there is research (university-based; 50% of NOAA funding including fisheries related projects), and education component, and an extension component (extension faculty that are statewide based at community colleges). They are a partnership program and they need to leverage funding through partnerships.

Sea Grant does formal and informal community education and outreach. They partner with SOEST in its Global and Environmental Sciences degree; They are subcontracted by the City and County of Honolulu to run the educational program at Hanauma Bay (including a lecture series at night) to make people aware of marine resources. The program educates both visitors and locals alike. Sea Grant works with PACRC in Hilo/UH Hilo for aquaculture training facility and coastal resources management in Hawaii and the Pacific. On Kauai they partner with the Waipa Education and Learning Center. They are involved in capacity building working with high schools and community colleges. Sea Grant people based in Marshalls and American Samoa.

The program supports sea grant graduate training and provides fellowships to graduate students in federal and local legislatures. They also work with MAASIP which provides opportunities for Am Sam students and Micronesians to return home to work on projects at resource agencies and provide graduate fellowships in marine resource economics and population dynamics.

They are involved in translation of fishery articles in Hawaiian language newspapers (with Bishop Museum) to develop a database of information that can inform management policy.

E. Local and Traditional Knowledge

CNMI Division of Historic Preservation-Herman Tudela

Herman Tudela provided the group with a copy of articles on traditional knowledge. He presented on the historical knowledge of the Chamorro people and how traditional fishermen have a keen understanding of different ocean events and weather patterns. He noted how human illnesses could identify seasonal runs of fish. He noted that traditional knowledge is also science and that traditional knowledge identified many different signs in nature.

Hawaii Community College (HiCC) Lawaia Program-Leialoha Ilae-Kaleimamahu

HiCC has developed a Hawaiian lifestyles program with three tracks-Lawai`a, Mahi`ai, and Hula. All of the tracks are up and running with Lawai`a being the newest. All of the programs have been in conception for at least 30 years. The Lawai`a track is a 2-yr certificate program that involves anything that has to do with the cultural practices of Lawai`a, including basic things such as moon, tides, etc. Some students come to the program right out of high school, some are older, non-traditional, students.

They have found that the young people are not interested in learning about lawai`a practice: Have we been that disconnected from our culture? We are all here because we are all connected to the ocean. The program provides a basis of what culture is and what is lawai`a. The program doesn't go out to communities and tell them how its done, but rather go to them to form a relationship to learn about the ocean in that particular area.

There are chants about the migratory patterns of fish both near the main islands and far from the islands which canoes follow also. It's good to know that modern science also shows the same thing that the people have known all along. It's validation of Traditional Ecological Knowledge.

They have learned that the practices still exist in the families in the community and that practices haven't been lost. It's important to use culture as a basis for our connection to the ocean. The ultimate goal of the program is to reconnect the learner to the environment in the hopes of affecting the way that they practice.

Traditional knowledge is science, so it shouldn't have to help science-based management. It has been proven through things like Hokulea and even fishermen.

The students need to know what is going on and understand how to figure out what is going on in your area. Instead of what how the ocean needs us, we should look at how we need the ocean.

Samoa knowledge-Henry Sesepasara

Henry provided some traditional fishing methods and management in American Samoa. 90% of land is owned by the Samoan people. Fisheries in the villages are very much traditional in the areas outside of PagoPago. Management is difficult for

government in those areas because communities manage themselves through traditional management regulations. The DMWR is working with villages and their Council of Chiefs on managing their own resources with their own management plan and their own regulations (when you can fish, where you can fish, how you can fish, etc). The traditional village-based management is good because people in the villages are making the regulations instead of the government telling them what to do.

A couple of villages still do the same kind of atule hukilau based on natural signs. The Manua islands have traditional fishing for juvenile goatfish (oama, *Mulloidichthys sp.*) using woven fish traps. There is also the Palolo (the reproductive bodies of a polychaete worm, *Palola viridnis*) a seaworm that spawns once a year that lives under the coral (October or November) tied into the Moso`oi (the perfume tree, ylang-ylang, *Cananga odorata*) plant. If the plant has thick flowers, then the spawning will be good.

Northern Marianas College (NMC)-Lawrence Duponcheel

Lawrence Duponcheel talked about preserving traditional methods with NOAA and NMC. He talked about a chumming device used to train fish to come to the surface over a number of weeks is being documented and preserved. A CDPP project is also building traditional fishing canoes and documenting the process through a video project.

Herman Tudela added that using this method, traditional people used this method to train bottomfish to decompress by coming up closer and closer to the surface by attracting them up over time. The fish then can decompress easier and come closer to the surface.

John Kaneko-PFRP project on traditional knowledge

John Kaneko described his project on traditional knowledge for PFRP and gave a background on his findings. One of the findings is that traditional knowledge found that ahi was experiencing overfishing a lot earlier than modern science did. Traditional information can inform scientists on how model may be changed or how assumptions should be made on the model (cycles, weather, etc).

Leialoha commented that TEK is not just knowledge, but is a mindframe: A way of thinking and a way of life, A thought process. Everything they do in the Lawai`a program develops the critical thinking and thought process which is inclusive of the traditional thought process.

Herman commented that based on cultural knowledge, you can also target different reproductive cycles for different species.

SUMMARY OF DAY 1

Kuumealoha Gomes asked for the participants to list some of the issues dealt with on the first day of the workshop.

Issues

1. Young people are not getting information about traditional practices, need to increase outreach to/involvement of young people to increase perpetuation of fishing practices, management, sustainability, economic development
2. Employment-lack of availability of positions does not encourage young people to come home after being educated/trained
3. Funding challenges-need to support/make sustainable; affects hiring of faculty/staff; affects infrastructure; program development
4. Aquaculture unique to particular island nations with challenges that are nature related
5. Disconnection/Reconnection-fishing is a lifestyle; need to reestablish that fishing is a lifestyle; skills are connected to values; fishing involves indigenous scientific methods
6. Need to increase partnerships
7. Illnesses connected to consumerism; fish spawning, ciguatera, etc.
8. Data collection-sometimes often design inappropriate; does not take into consideration community/cultural indices
9. Collaborative partnerships
10. Need licensing programs at Community Colleges and Universities
11. Need Captain training (and other educational programs)

At the end of the first day Kuumealoha Gomes reviewed some of the information covered. She went over the goals of the workshop and assigned homework to the participants: think about the issues and how to develop the program and how it should work.

The Goals and objectives of the workshop:

- Develop a Pilot program that addresses the mandates of Section 305 (j)
- Understand what kind of programs currently exist in the region
- Determine the “gaps,” relevant to MSA Section 305 (j), Marine Education and Training, that exist in the region
- Develop a process to fill those “gaps.”

July 16, 2008 9:00 AM

The second day began with a review of the first day’s activities, reiteration of the goals and objectives and a discussion to address the development of a pilot program for the MET program. The workshop broke into groups to discuss what kind of program would be needed for different areas and issues. The discussion was wide ranging with different needs and different ideas being proposed.

	American Samoa	CNMI	Guam	Hawaii	Comment
<p>A. Employment training in:</p> <ul style="list-style-type: none"> • Marine technology • Marine related professions • Marine resource conservation and management • Marine science • Maritime operations. 	<p>Limited or non-existent, Potential for increased employment training exists at ASCC. Employment opportunities limited.</p>	<p>Limited or non-existent. Potential increased employment training exists at NMC. Employment opportunities limited.</p>	<p>Training for marine resource conservation, and marine science available at UOG-ML.</p>	<p>Training for marine resource conservation, and marine science available at UH-Manoa Sea Grant and HPU. Training in marine technology, marine related professions, conservation and management, science and maritime operations available at UH-MOP. Training in marine technology and maritime operations available at Honolulu CC. Alu Like provides training for employment in marine careers through their marine education program</p>	<p>-Limiting factor is availability of work. -Hawaii has training and employment opportunities. -Other areas have limited employment opportunities for marine related employment</p>
<p>B. Fisheries and seafood-related training</p> <ul style="list-style-type: none"> • Fishery 	<p>Seafood safety and marketing available through private contractor Pac Mar</p>	<p>Seafood safety and marketing available through private contractor Pac Mar</p>	<p>Seafood safety and marketing available through private contractor Pac Mar</p>	<p>Seafood safety and marketing available through private contractor Pac Mar,</p>	

<ul style="list-style-type: none"> observers Seafood safety Seafood marketing 	on as available basis.	on as available basis.	on as available basis. Guam Fisherman's Co-op provides venue and training for their fishermen.	United Fishing Agency is training venue.	
<p>C. Outreach Programs for consumer education</p> <ul style="list-style-type: none"> On quality and sustainability of wild fish On fish products farmed through responsible aquaculture 	Non-existent	Non-existent	Limited to Non-existent, GFCA conducts limited consumer education.	Outreach, consumer education and marketing conducted by industry.	<ul style="list-style-type: none"> -There is no focused effort for consumer education. -Hawaii Seafood Council planning consumer education initiative in Hawaii. -No consumer education for aquaculture products
<p>D. Identify methods and technology to improve:</p> <ul style="list-style-type: none"> Data collection Data quality Data reporting Sustainability of fishing practices 	Wespacfin, WPRFMC. ASCC marine program trained for collection of data by creel survey	Wespacfin, WPRFMC. data collected by DFW, monitoring by DFW	Wespacfin, WPRFMC. GFCA collects data from their fisherman, voluntary data collection program.	PIFSC, PIRO, Longline observer program, WPRFMC,	UOG, UH, HPU have degree programs for marine science that trains students in data collection analysis.
<p>E. Develop means by which local and traditional knowledge can enhance science-</p>	Limited or non-existent. Traditional training occurs in villages.	Limited or non-existent. Traditional fishing and wayfinding projects	Limited or non-existent. UOG offers programs for teaching of	Limited, UH has Hawaiian Studies program, Hawaii CC offers lawai`a	Needs focused effort to increase participation of native community in

based management of fishery resources in the region.		have been initiated in CNMI. Traditional training occurs in villages.	traditional navigational knowledge. TASI, organization for traditional wayfinding.	program for learning traditional fishing methods, Honolulu CC offers boat building of traditional craft.	fishery and resource management.
F. Develop partnerships with agencies, academic institutions and other entities.	Established MOU with independent Samoa to share fishery data.	Some effort being made to partner with environmental NGOs.	Limited effort to partner with organizations on fisheries related initiatives.	Active partnering between NGO and other organizations.	Need to establish and encourage partnering for education.

All of the educational areas are addressed in some form through out the region but the equitable delivery of the information is not happening. It was suggested that as a start scholarships and grants could be used to get promising students from the region to go to where the education is available. The community should be involved in selecting students for this activity. For instance, American Samoa would like some select students to be able to complete the Honolulu Community College certificate program in Marine Education and Training Center and return to American Samoa with those skills.

It was noted that education delivery systems (schools, community colleges and universities) exist in all of the different areas of the Western Pacific. An exchange system could be set up so that key educators could be in an exchange system to improve or increase the educational opportunities that exist in a specific area.

The participants noted the lack of a fishery school or curriculum in the Western Pacific. A fishery school is needed for fishery development in areas that need fishery development. With fishery development would be increased economic incentive for students to stay home.

The marine educational and training initiatives of organizations like Alu Like, Pac Mar, Guam 4H, Guam Fisherman's coop should continue to be funded and a schedule of training should be established with regular funding. Continuing education and community colleges are designed to service their communities.

Government needs to create scholarships to fill positions that government needs like fishery management, data collection, etc. Needs analysis of all of the communities should be conducted and programs developed to meet those needs. This analysis would also inform the community of the partnerships and organizations that need to be involved to benefit the community. Partnerships are needed to increase the efficiency and benefits of learning to the community. Support from government and NGOs are necessary for success of education initiatives.

Credit and accreditation method should be developed so that students could use experience and traditional knowledge can be given credit for achievement of certificates of completion from schools.

Need to develop a mentorship program in all areas of fisheries and traditional knowledge so appropriate mentors available to assist students toward completion of course of study.

Need to compile information on existing scholarships and grants for this initiative.

Need to build on existing programs to deliver better information to customers and the community on seafood, fisheries and marine issues.

Priority Areas for Marine Education:

- Adult education opportunities needed:
 - Adult education for marine licensing and operator certification for vessels.

- Increased education opportunities for CG and other licensing and training.
- Education for boat operations safety,
- Economic training for successful fishing opportunities and successful commercial fishing.

Youth education opportunities:

- Educational materials need development,
- Traditional knowledge curriculum needs development.
- Stronger science curriculum with emphasis on practical applications and emphasis students going on to higher education opportunities.
- Economic Development opportunities needed so youth stay home or return home to give back to the community.
- Scholarship program that partners with government fill the government need fishery and other natural resource managers.

Appendix A



**WESTERN
PACIFIC
REGIONAL
FISHERY
MANAGEMENT
COUNCIL**

**Marine Education and Training Program
Development Workshop
April 15-16, 2008
Council Office
Honolulu, Hawaii**

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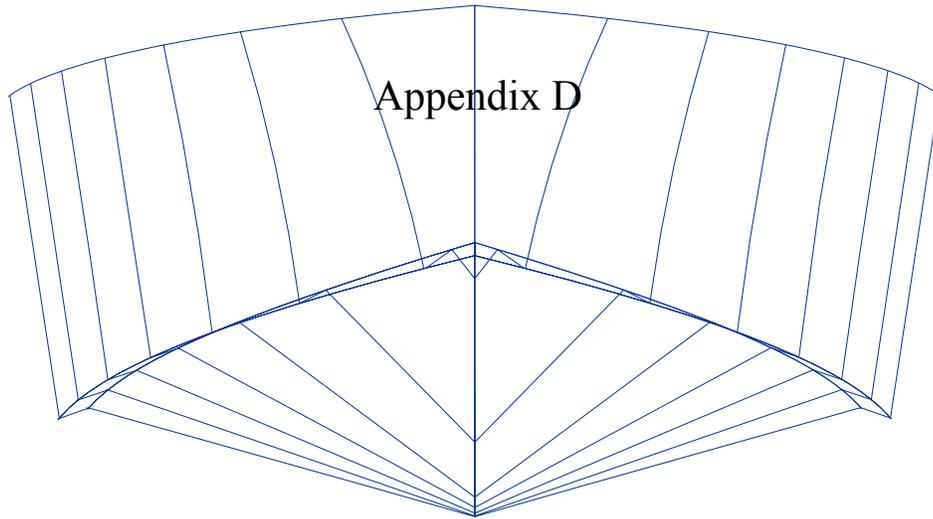
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Appendix C

Magnuson-Stevens Fishery Conservation and Management Act, Section 305:

(j) WESTERN PACIFIC AND NORTHERN PACIFIC REGIONAL MARINE EDUCATION AND TRAINING-

- (1) IN GENERAL- The Secretary shall establish a pilot program for regionally-based marine education and training programs in the Western Pacific and the Northern Pacific to foster understanding, practical use of knowledge (including native Hawaiian, Alaskan Native, and other Pacific Islander-based knowledge), and technical expertise relevant to stewardship of living marine resources. The Secretary shall, in cooperation with the Western Pacific and the North Pacific Regional Fishery Management Councils, regional educational institutions, and local Western Pacific and Northern Pacific community training entities, establish programs or projects that will improve communication, education, and training on marine resource issues throughout the region and increase scientific education for marine-related professions among coastal community residents, including indigenous Pacific islanders, Native Hawaiians, Alaskan Natives, and other underrepresented groups in the region.
- (2) PROGRAM COMPONENTS- The program shall—
 - (A) include marine science and technology education and training programs focused on preparing community residents for employment in marine related professions, including marine resource conservation and management, marine science, marine technology, and maritime operations;
 - (B) include fisheries and seafood-related training programs, including programs for fishery observers, seafood safety and seafood marketing, focused on increasing the involvement of coastal community residents in fishing, fishery management, and seafood-related operations;
 - (C) include outreach programs and materials to educate and inform consumers about the quality and sustainability of wild fish or fish products farmed through responsible aquaculture, particularly in Hawaii, Alaska, the Western Pacific, the Northern Pacific, and the Central Pacific;
 - (D) include programs to identify, with the fishing industry, methods and technologies that will improve the data collection, quality, and reporting and increase the sustainability of fishing practices, and to transfer such methods and technologies among fisheries sectors and to other nations in the Western, Northern, and Central Pacific;
 - (E) develop means by which local and traditional knowledge (including Pacific islander, Native Hawaiian, and Alaskan Native knowledge) can enhance science-based management of fishery resources of the region; and
 - (F) develop partnerships with other Western Pacific Island and Alaskan agencies, academic institutions, and other entities to meet the purposes of this section.



Appendix D

Mission Statement

The Small Vessel Fabrication & Repair program's mission is to serve the community as a learner-centered, open door program providing technical training to meet the demands of companies within the Small Vessel Fabrication and repair industry as well as the needs of the individual. An open-exit option allows students to identify their career objectives and participate in program exploration.

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SMALL VESSEL FABRICATION & REPAIR

Honolulu Community College
University of Hawaii

DESCRIPTION – *Small Vessel Fabrication and Repair* is a two-year program whose main goal is to prepare individuals for employment in the vessel repair, fabrication, service and maintenance sector of the marine industry. Students work on a variety of “real world” repair, service and construction projects. Hands-on instruction is provided in composite boat construction and repair, marine woodworking and joinery, lofting, plug and mold construction and marine spray painting systems. Boat yard operation skills are learned and practiced year round. These include marine straddle-lift operation, crane operation, forklift and hydraulic trailer operation. There are also courses that focus on the rigging, mechanical, plumbing, propulsion, and electrical systems of boats.

The faculty offers a wealth of knowledge and experience to the students. Each instructor’s craft has been developed and honed from over twenty years in the marine industry. Faculty repair and building projects and technical articles have been published in texts and national trade magazines.

The majority of instruction for the program is held at the Marine Education and Training Center (METC) located on Sand Island, Oahu. The METC is located on Keehi Lagoon and is a state-of-the-art training facility. It features four large work bays to allow work on vessels up to 45 feet, a concrete pier equipped with two cranes to allow work on vessels in the water, finger piers for removing vessels from the water employing a marine straddle-lift, as well as classroom, laboratory, and office space. The METC ranks as one of the premier training facilities in the United States.

COMPETENCIES/LEARNING OUTCOMES OF GRADUATES–Program Graduates learn a wide variety of technical skills. The marine technician, upon completing the program, can fabricate, repair, and modify composite boats according to blueprints and customer specifications using hand tools, power tools, and measuring instruments. They can build interior furniture and apply marine paints and coatings with specialized spray equipment. They can build composite boats, plugs and molds using a variety of construction techniques. Graduates can also survey, troubleshoot, repair, and install components in DC electrical systems, mechanical, sailboat rigging, and plumbing systems. They can perform basic service, alignment, and installation of propulsion systems. In addition, the METC technician confers with customers and supervisory personnel to reach agreement on the work order, which outlines the scope of the work. Students are also given the opportunity to sit for the CERTIFIED COMPOSITES TECHNICIAN-MARINE, designation, from the American Composites Manufacturer’s Association. **Additionally, because of the extensive cross-training, graduates have the technical skills to enter a variety of adjunct vocations.**

COST - Tuition (full-time resident) - \$49.00 per credit. Tuition (non-resident) - \$242.00 per credit.

In addition to tuition, the total Cost of Books, Tools and Supplies for the two year program are approximately \$1500.00. There are many grants and financial aid programs available. Contact the Financial Aid Office (808) 845-9116 for information.

HOUSING – Though the METC does not have housing accommodations on-site, we do have a referral program which includes dormitories at the University of Hawaii’s Manoa campus (a 30 minute bus ride) and at some of the hotels. Approximate cost for housing at a hotel is \$2,300.00 per semester. Meals are extra.

PHYSICAL FITNESS –Most of the marine industry, and thus this program, is physically demanding. To fulfill the requirements of the shop portion of the class, the student must have the strength and agility to climb a twelve-foot ladder onto a vessel's deck, get on the deck, walk around the cabin and descend to ground in a time period of not more than twice the time it takes for the instructor to perform the test. The student must be able to jump onto the deck of a boat that is eighteen inches below pier level, work in a crouching or standing position, and be able to lift 40 pounds from the floor onto a 34" high table top.

HEALTH HAZARDS – There are hazards in the boat maintenance and repair industry as well as this program. Great emphasis is placed on operating tools and equipment safely and knowing what protective gear is necessary to wear and how to wear it. A partial list of the hazards that students are trained to avoid are: exposure to rapidly moving parts and blades, live electrical circuits, exposure to resins, solvents, paints, exhaust fumes, and dust. Students will be required to fill out a standard OSHA screening questionnaire. This will aid in determining whether or not you can safely wear an organic respirator.

EMPLOYERS – Marinas (general boat service and repair) and firms that specialize in marine electrical, rigging, plumbing and/or propulsion systems. Boat manufacturers and companies performing fabrication of fiberglass reinforced plastic and other composite materials, painting and re-finishing companies, companies fabricating custom wood products (furniture and cabinetry) and heavy equipment operators.

CAREER LADDER: ENTRY LEVEL - Assistant to Crew Chief, Crew Chief, Foreman, Manager, and Plant Manager (also Marine Surveyor, Small Business Owner, and Broker)

EMPLOYMENT OPPORTUNITIES - Openings available locally, and Nationally with boatbuilders, shipyards, marine service companies, rigging companies, painting firms, composite manufacturers, furniture and cabinetmakers.

WAGES - Beginning wages average between \$10 and \$16 an hour. Experienced technicians earn much more.

SMALL VESSEL FABRICATION AND REPAIR

Sequence of Courses

Associate in Applied Science Degree

The goals of the program are to prepare the student with the skills and competencies necessary for a successful career as a marine technician. To instill the attitude and work habits that are necessary for a successful career; and to enable the student to become a lifelong learner who can keep abreast of the latest technological changes in the marine field.

Program Prerequisites: Math B&C&D or placement in Math 50/53

English 20 B, C, D & E or ESL 11, 12 & 13 or placement in English 22/60

First Semester

	Degree Credits
MARR 20 - Introduction to Marine Technology	1
MARR 21 - Boat Hauling Procedures	4
MARR 22 - Portable Hand Tools and Machinery	1
MARR 24 - Introduction to Composite Technology	3
MARR 25 - Composite Repair Techniques	3
MATH 50 - Technical Mathematics	3
	15/16

Second Semester

MARR 29 - Blueprint Reading for Marine Technicians	2
MARR 30 - Woodworking	3
MARR 31 - Yacht Joinery	3
MARR 33 - Marine Finish Systems	4
PHYS 56 - Fundamentals of Electricity	4
	16

Third Semester

MARR 40 - Marine Blueprint Reading and Lofting	3
MARR 41 - Mold Station Construction	2
MARR 42 - Marine Propulsion Service and Maintenance	3
MARR 43 - Composite Tooling	4
ENG 60 - Technical Writing	3
	15

Fourth Semester

MARR 50 - Mold Fabrication	3
MARR 51 - Composite Production	3
MARR 52 - Marine Electrical Systems	2
MARR 53 - Marine Plumbing	2
MARR 54 - Rigging	2
PSY 180 - Psychology of Work	3
ICS 100T - Computer Literacy and Applications (Transportation)	3
	18

Minimum Credits Required **64**

SMALL VESSEL FABRICATION and REPAIR

Course Descriptions

1st Semester

MARR 20 Introduction to Marine Technology (1 credit)

Introduces the student to career opportunities in the marine service and manufacturing industries. It also serves as an orientation to the Marine Education and Training Center (METC) and its policies. Students will be trained to fit personal protective equipment and to understand Material Safety Data Sheets. Marine nomenclature is also introduced with an emphasis on the terms used when vessels are hauled and secured on land. (30 hrs. lecture / lab)

MARR 21 Boat Hauling Procedures (4 credits)

Trains students in boatyard skills. It covers the procedures followed in removing a mast from a sailboat, hauling and launching a vessel with a straddle-lift, pressure-washing a boat hull, waste water containment and treatment, moving a vessel with a marine hydraulic trailer and forklift, and blocking a boat. Personal safety is stressed throughout the course. (120 hrs. lecture / lab)

MARR 22 Portable Hand Tools and Machinery (1 credit)

Provides an introduction to hand tools and machinery used in the marine industry. The proper use of machinery such as a hydraulic prop and bearing remover, bead blaster and sandblaster will be demonstrated and practiced. The following woodworking tools will be introduced: table saw, bandsaw, power hand planer, and drill press. Hands -on training is emphasized. The proper utilization, safety procedures, and care of tools are stressed. (30 hrs. lecture / lab)

MARR 24 Introduction to Composite Technology (3 credits)

Covers the fundamentals of working with resins, fabrics, and adhesives. Projects include the fabrication of solid and cored test panels. The methods used to insure quality control in the composites industry are also stressed. (90 hrs. lecture / lab)

MARR 25 Composite Repair Techniques (3 credits)

Covers the procedures employed in planning and executing repairs to composite vessels. Various common procedures used in the industry for composite repairs are covered in lecture, and projects dealing with these procedures are provided in the lab. (90 hrs. lecture / lab)

MATH 50 Technical Mathematics 1 (3 credits)

Basic algebra and basic geometry as applied to shop problems. Intended for students interested in vocational-technical programs. (3 hrs. lecture per week)

2nd Semester

MARR 29 Blueprint Reading for Marine Technicians (2 credits)

Prepares the student to read and understand working drawings typical to the marine and cabinetry industries. Basic drafting techniques will be practiced but the emphasis is on interpretation of blueprints and understanding spatial relationships in orthographic projections. Blueprints of projects that will be built in Woodworking and Yacht Joinery will be studied. Sketching both orthographic and isometric views will be practiced. The student will attain a working knowledge of SI Metric and Imperial measurement systems. (60 hrs. lecture / lab)

MARR 30 Woodworking (3 credits)

Covers the safe and proper use of power and hand woodworking tools. Procedures for sharpening, maintaining, and adjusting of tools are stressed. Rough wood stock is milled and the fabrication of proper wood joints is stressed. Instruction is also provided in the survey and repair of the wooden components of a vessel. (90 hrs. lecture / lab)

MARR 31 Yacht Joinery (3 credits)

Advanced joinery projects are covered in this course. Projects include lamination techniques, biscuit joinery, and rabbeted moldings. Hands-on instruction in the use of the radial arm and table saws, mortising machine, shaper, and router is also provided. (90 hrs. lecture / lab)

MARR 33 Marine Finish Systems (4 credits)

Covers the fundamental techniques involved in the application of modern marine finishes. Projects stress proper and efficient surface preparation. Hands-on experience in the use of the siphon gun, pressure pot system, and HVLP systems is also included. (120 hrs. lecture / lab)

PHYS 56 Basic Electrical Theory and Lab (4 credits)

A comprehensive study of the fundamentals of electrical and electronic principals, covering basic laws that describe electrical phenomena to principals of semiconductor devices like transistors and diodes. Use of meters and oscilloscope are also covered. (3 hrs. lecture, 3 hrs. lab. per week)

3rd Semester

MARR 40 - Marine Blueprint Reading and Lofting (3 credits)

Covers the reading and interpretation of boat plans. The primary focus is on the Lines Plan. The Lines Plan describes the shape of the hull. An understanding of these lines is fundamental to any boat building, renovation, or major repair project. Projects in the drafting lab and on loft floor provide practical experience in relating the blueprints to the construction or renovation of a boat. (90 hrs. lecture / lab)

MARR 41 Mold Station and Stem Construction (2 credits)

Provides detailed instruction in creating a mold station and a stem form from the lofting completed in MARR 40. Station and stem bevels and skin deductions are emphasized. The end product of this course will be completed mold stations and a stem for the project boat. (60 hrs. lecture / lab)

MARR 42 Marine Propulsion Service and Maintenance (3 credits)

Provides instruction in the care, maintenance, and service of gasoline fueled outboard and sterndrive engines as well as basic diesel service. Understand the operational principals of marine steering systems and perform maintenance, service and troubleshooting. (60 hrs. lecture / lab)

MARR 43 Composite Tooling (4 credits)

Uses the mold stations and stem form built in MARR 41 to erect a hull skeleton on a building form. Transoms are fabricated. A skin or planking of foam or wood is applied. Spiling techniques are emphasized. Fairing of the hull is practiced. (120 hrs. lecture / lab)

ENG 60 Technical Writing (3 credits)

Study of effective ways of writing straightforward paragraphs of technical information. Emphasis is placed on writing technical information clearly, concisely, accurately and precisely. Includes units on using visuals for clear written communication. (3 hrs. lecture per week)

4th Semester

MARR 50 Mold Fabrication (3 credits)

Uses the hull form constructed in earlier courses as a pattern to fabricate a production mold. Tooling procedures including Chopper gun techniques and use, adjustments, and maintenance and gel coat application is also covered. (90 hrs. lecture / lab)

MARR 51 Composite Fabrication (3 credits)

Uses a production mold to produce a boat hull. Coring of a laminate and vacuum bag techniques are also covered. (90 hrs. lecture / lab)

MARR 52 Marine Electrical Systems (2 credits)

Builds on the theory and practice learned in Physics 56, Fundamentals of Electricity. The emphasis is on DC systems. Troubleshooting a boats electrical system with a multi-meter will be practiced. Electrical installations per American Boat and Yacht Council standards will be emphasized. (60 hrs. lecture / lab)

MARR 53 Marine Plumbing (2 credits)

Will include lecture and hands-on instruction in marine plumbing. The student will develop the necessary skills to perform the proper installation of marine sanitation and fresh water systems. This will include proper installation of heads, seacocks, thru-hulls, anti-siphon devices, accumulator tanks, holding tanks, check valves and a variety of electric and manual pumps. Nomenclature of plumbing components is stressed. (60 hrs. lecture / lab)

MARR 54 Sailboat Rigging (2 credits)

Provides an introduction to the maintenance of a sailboat's rigging system. Emphasis is placed on surveying a sailboat's rigging for potential failures caused by improper installation, corrosion or structural fatigue. Applying fittings to wire via cold - rolled swage, mechanical (Norseman type) fittings, and the micro-press swage will be practiced. Installation of roller furling systems will be covered. (60 hrs. lecture / lab)

PSYCH 180 Psychology of Work (3 credits)

Introduction to psychological aspects of work-related phenomena with emphasis on importance of human relations in work settings. Focuses on application of industrial organizational theory to understanding problems in worker morale, impression management, career assessment, organizational versus individual goals. (3 hrs. lecture per week)

ICS 100T Computing Literacy and Applications (Transportation) (3 credits)

This course is a computer literacy course. It provides those basic concepts and skills related to computers and computing that are needed in today's information age, and, in particular, in the general area of transportation. The students will acquire an understanding of concepts in word processing and basic skills in other applications appropriate to the transportation industry. (Credit may be received for only ICS 100, 100E, 100M or 100T) May be taken on a CR/N basis. (3 hrs. lecture per week plus lab assignments)

VESSEL FABRICATION and REPAIR

Program Competencies/Learning Outcomes

A graduate of the Vessel Fabrication and Repair program should be able to:

Marina Operations

- Secure a vessel to the dock or pier with correct placement of fenders, lines, and appropriate knots
- Operate telescoping crane to pull and step sailboat masts
- Operate Marine Travel–Lift to safely lift vessel from the water. Also perform start up check
- Operate pressure wash system
- Operate and maintain bottom wash water treatment system
- Block and secure vessel on land
- Operate Forklift and perform start up check
- Operate Marine Hydraulic Trailer and perform start up check
- Choose appropriate anti-fouling bottom paint and apply

Joinery / Woodworking Skills

- Operate and maintain standard woodshop stationary tools including: Jointer, Thickness Planer, Table Saw, Band Saw, Radial Arm Saw, Panel Saw, Shaper, Mortiser, Tool grinder, and Drill Press
- Operate and maintain standard woodshop portable electric tools including: Circular Saw, Miter Saw, Saber Saw, Bayonet Saw, Power Hand Planer, Pneumatic Circular Saw, Routers, Grinders, Polishers, and Detail Sanders
- Operate and maintain portable pneumatic tools including: Dual Action Sanders, Polishers, In-line Sanders, Staple and Nail Guns
- Sharpen, tune, and efficiently use standard woodworking hand tools
- True wood stock accurately, safely and efficiently

- Identify species of wood common to boatbuilding and repair. (The student is also introduced to wood technology, lumber grading, detection of defects, and prediction of dimensional stability using a moisture meter.)
- Construct shop fixtures, marine joiner's toolbox, tool shop cart with rabbeted quarter round posts
- Construct lap, rabbet, dowel, biscuit, and mortise and tenon joints
- Execute installation of plastic laminates
- Read and interpret furniture blueprints
- Sketch simple drawings in both orthographic and isometric styles

Mechanical

- Remove a propeller from a shaft
- Operate a hydraulic cutless bearing remover
- Re-pack and adjust a standard stuffing box
- Operate bead blaster
- Operate sandblaster

Composites

- Identify composite fabrics and state when and why a certain fabric should be used
- State the practical principals of polyester and epoxy resin chemistry
- Utilize the concept of specific gravity to perform weight to volume conversions for accurate mixing of components
- Create a shop chart from a resin's product data sheet indicating minimum and maximum catalyst levels in cubic centimeters per liter per product data sheet
- Properly catalyze resins and add various components (fillers, promoters) to polyester/epoxy resins for differing applications and working conditions
- Perform standard quality control tests - gel-time, peak exotherm test, and Barcol hardness, and bending modulus calculations

Composite Repair

- Present a systematic approach to surveying a boat's hull and deck damage or poor construction, stressing the use of the senses (sight, touch, smell and sound) as diagnostic tools
- Demonstrate the use of the moisture meter as a surveying tool in order to discover excess moisture in a composite laminate
- Execute cosmetic gel coat repairs and blisters
- Execute solid fiberglass repair
- Execute cored hull repair

- Execute structural reinforcing

Marine Coatings

- Perform refinish survey to determine scope of work
- Perform surface preparation including selection of tools and abrasives
- Calculate material cost of refinishing project
- Calculate air compressor requirements for finish systems and identify function of the air delivery system components
- State and perform safety checks of Breathing Air System
- Perform set-up and adjustment of Siphon Gun, Conventional Pressure Pot, and High Volume Low-Pressure Spray (HVLP) application systems including nozzle, needle, and air cap selection
- Perform brightwork finishing and refinishing
- Perform maintenance and clean up of equipment
- Perform wet sanding and polishing of defects
- Perform maintenance of Spray Booth

Blueprint Reading and Lofting

- Demonstrate understanding of a lines plan by adding waterlines, buttocks, sections, and diagonals to an existing drawing utilizing basic mechanical drafting tools
- Prepare full size drawing (lofting) of a boat in order to create templates for mold stations, stem, keelson, stem, and transom
- Expand transom (develop true shape of transom creating an auxiliary view)
- Calculate skin or "planking" deduction from lofting
- Calculate mold station and stem bevels

Hull and Deck Manufacturing

- Fabricate all components necessary to build a boat hull from the lofting including: strong-back, mold stations, stem and stem forms, keelson
- Erect stations, stem, keelson and transom per lofting
- Apply longitudinal members (ribbands, sheer clamps)
- Spile various sheathing materials (wood veneer or structural PVC sheet foam)
- Set up and execute vacuum bagging of laminates and core materials
- Execute vacuum infusion program to a laminating process
- Apply manual and sprayable fairing compounds and fair to a high gloss

Mold Construction

- State fundamental principles of how to attain quality mold cosmetics
- Repair surface imperfections in the mold
- Apply manual and sprayable mold release systems
- Apply tooling gel-coat with a pressure pot with correct catalyst percentages, gel times, and at the correct 18-24 mils thickness
- Calibrate and operate a chopper gun.
- Mix multi-component tooling resin systems (i.e. Tooling Resin) to specs and apply with a chopper gun
- Fabricate reinforcements for stabilization of the tool
- Install compressed air release systems in mold

Propulsion

- State the basic operational principles of outboard, sterndrive, and diesel engines
- Perform basic service of outboard engines
- Perform basic service on sterndrives and diesel engines
- State the operational principals of basic steering systems and perform basic maintenance and service

Marine Electrical

- Perform trouble-shooting and testing of marine DC circuits utilizing a multi-meter or continuity tester
- Perform installation of components in a ship's dc system (lights, coaxial connections / vhf radio, transducer and knot meter). This would involve calculating load on circuit and wire sizes per American Boat and Yacht Council recommendations
- Perform marine battery service, recharging and installation
- Understand the life threatening importance of checking polarity of AC shore power
- Predict the rate of underwater metal corrosion and whether the metal has too much or not enough anodic protection

Marine Plumbing

- State Federal marine wastewater discharge regulations
- Choose the proper plumbing components for marine (vs. residential) plumbing installations. The components emphasized are sea cocks, thru-hulls, hose and hose clamps, pipe and pipe connections, valves, pumps, anti-siphon devices and tanks
- Install a marine sanitation system including thru-hulls, hose, anti-siphon devices, valves, heads, and holding tanks to USCG, EPA, and ABYC guidelines
- Troubleshoot a marine sanitation system

- Install a potable water system with manual and automatic pumps; check valves and accumulator tanks
- Design a composite water or holding tank
- Install a Type III sanitation device that treats waste electro-chemically for legal overboard discharge within three miles of shore

Sailboat Rigging

- Survey a sailboat's rig from mast step to masthead
- Attach fittings to spars with rivets, machine screws, bolts, compression tubes ...
- Attach fittings onto wire rope with a hydraulic swaging machine, micro-press, and mechanical fittings (Norsemen)
- Rig necessary lines to safely go aloft for rig inspection in a boatswain's chair
- Install and rig a roller furling system
- Replace the running and standing rigging